

Claims

What is claimed is:

1. A control system for an internal combustion engine having a plurality of combustion chambers, each said combustion chamber having at least one valve movable between a first position at which fluid is blocked from passing through the valve, and a second position at which fluid is permitted to pass through the valve, said control system comprising:

a plurality of valve actuators, each of said valve actuators being operatively connected to at least one of a plurality of valves, that in turn are each associated with at least one of a plurality of combustion chambers and adapted to be capable of at least one of opening said at least one valve and holding open said at least one valve; and

a controller operatively connected to said plurality of valve actuators and adapted to command the use of one or more selected valve actuators of said plurality of valve actuators to provide substantially balanced usage over time of each of said plurality of valve actuators.

2. The control system of claim 1, wherein said controller is adapted to command the use of said selected ones of said plurality of valve actuators using a patterned selection scheme.

3. The control system claim 1, wherein said controller is adapted to command the use of said selected ones of said plurality of valve actuators using a sequential selection scheme.

4. The control system of claim 1, wherein said controller is adapted to command the use of said selected ones of said plurality of valve actuators using a random selection scheme.

5. The control system of claim 1, wherein said substantially balanced usage over time is based on number of actuation events for each of said plurality of valve actuators.

6. The control system of claim 1, wherein said substantially balanced usage over time is based on accumulated actuation time for each of said plurality of valve actuators.

7. A control system for an internal combustion engine having a plurality of combustion chambers, each said combustion chamber having at least one valve movable between a first position at which fluid is blocked from passing through the valve, and a second position at which fluid is permitted to pass through the valve, said control system comprising:

a plurality of valve actuators, each of said valve actuators being operatively connected to at least one of the plurality of said combustion chambers and adapted to cause the release of pressure from each of said combustion chambers to which said valve actuator is operatively connected; and

a controller operatively connected to said plurality of valve actuators and adapted to command the use of less than all of said valve actuators in a substantially balanced manner.

8. The control system of claim 7, wherein said engine braking controller is adapted to command the use of less than all of said valve actuators using a patterned selection scheme.

9. The control system of claim 7, wherein said engine braking controller is adapted to command the use of less than all of said valve actuators using a sequential selection scheme.

10. The control system of claim 7, wherein said controller is adapted to command the use of less than all of said valve actuators using a random selection scheme.

11. The control system of claim 7, wherein said substantially balanced manner is based on number of actuation events for each of said plurality of valve actuators.

12. The control system of claim 7, wherein said substantially balanced manner is based on accumulated actuation time for each of said plurality of valve actuators.

13. A control system for an engine having a plurality of combustion chambers, said control system comprising:

means for actuating at least one valve associated with each of at least two of said combustion chambers; and

means for controlling said pressure releasing means, said controlling means being adapted to command the use of less than all of said actuating means in a substantially balanced manner over time.

14. The control system of claim 13, wherein said controlling means is adapted to command the use of less than all of said actuating means using a patterned selection scheme.

15. The control system of claim 13, wherein said controlling means is adapted to command the use of less than all of said actuating means using a sequential selection scheme.

16. The control system of claim 13, wherein said controlling means is adapted to command the use of less than all of said actuating means using a random selection scheme.

17. The control system of claim 13, wherein said substantially balanced manner over time is based on number of actuation events for each of said plurality of valve actuators.

18. The control system of claim 13, wherein said substantially balanced manner over time is based on accumulated actuation time for each of said plurality of valve actuators.

19. A method of valve actuation for an engine having a plurality of combustion chambers, said valve actuation method comprising:
determining that actuation of at least one valve associated with less than all of said combustion chambers is desired; and
actuating said at least one valve associated with less than all of said combustion chambers in a substantially balanced manner over time.

20. The method of claim 19, wherein the substantially balanced manner includes a patterned scheme for selection of said at least one valve that is to be actuated.

21. The method of claim 19, wherein the substantially balanced manner includes a random scheme for selection of said at least one valve that is to be actuated.

22. The control system of claim 19, wherein said substantially balanced manner over time is based on number of actuation events for each of said plurality of valve actuators.

23. The control system of claim 19, wherein said substantially balanced manner over time is based on accumulated actuation time for each of said plurality of valve actuators.